THE

VETERINARY JOURNAL

Editor :

FREDERICK HOBDAY, C.M.G., F.R.C.V.S., F.R.S.E.,

HONORARY VETERINARY SURGEON TO HIS MAJESTY THE KING.
OFFICIERE DU MERITE AGRICOLE (FRANCE).
CAVALIERE DEI S. S. MAURIZIO E LAZARO (ITALY).
HONORARY MEMBER OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION.
AND FORMERLY PROFESSOR IN THE ROYAL VETERINARY COLLEGE, LONDON.

Sub-Editor :

GLADSTONE MAYALL, M.R.C.V.S.

FEBRUARY, 1920.

PROFESSIONAL PROGRESS.

ALTHOUGH we have passed through the black period of war, it has not been all misfortune for our profession. In fact, it might almost, from the professional standpoint, be fairly put down as otherwise.

At all events we have not stood still, and in more ways than one we have made progress.

Certainly, in so far as the Army has been concerned, we have improved our status and established a reputation for usefulness which will stand for all time, and it will be a very short-sighted policy for any Army to commence a war without a well and properly equipped Department for looking after the animals in health and dealing with them when diseased. Without being in the least degree boastful, the Royal Army Veterinary Corps can truthfully say that in the Great War it " played its part."

The civilian, too, must not forget his gratitude to the Veterinarian, as had it not been for the careful precautions taken by the Army Authorities and the Board of Agriculture the stock of the country would now, for a certainty, have been overrun with sickness and contagion. As it is there never was a period when the live stock of this country was more healthy, and this, too, at the termination of the greatest war in history, a war in which millions of animals have been engaged.

For those of our graduates who have returned to civilian practice the situation is much changed from what it was five years ago, as in large cities the progress of motor traction has lessened the numbers of horses used for both pleasure and work. The town practitioner finds this out much more than his country *confrére*, and it is not possible to close one's eyes to it. In the country the enormously increased value of agricultural stock has made all classes of it worth medical attention, and the country practitioner has benefited considerably thereby. What the future will bring forth can only be surmised and time alone can tell, but for the present the farmer lives in clover, and when he is prosperous the country practitioner prospers too.

State Veterinary Medicine seems at last to be moving, and there appears to be a prospect of whole time appointments in each county under the Ministry of Health. If efficiently paid these will attract good men, whose influence will undoubtedly be felt in the efforts made to stamp out disease amongst our flocks and herds, and be of inestimable pecuniary benefit to the agriculturist and to the whole community. Canine practice is an important factor in all town practices, and affords many interesting cases which one does not get in the larger varieties of animals. It is quite time that our Colleges gave special attention to this side of Veterinary practice, as it has many points of its own and can be made a lucrative addition to the income of the general practitioner. Money is badly needed for the equipment of our Colleges in order to bring them up-to-date and in line with modern requirements. Here again the State should help, as at least we should equal, in this respect, our Continental *confrères*. The question, too, of the next International Veterinary Congress will have to be raised, and a proposal is already under consideration that it shall be held in America; probably, if this is arranged, it will be the best solution of what would otherwise be a difficulty. Progress during the next year must of necessity be slow for all professions, and it rests with ourselves to recognise this, but if all of us "do our bit" to make it sure, the profession will come out all right and eventually have, for the straightforward worker, as good an outlook as before the war.

THE VERMIN QUESTION.

QUESTIONS relating to the habits and destruction of vermin must, of necessity, interest us as a profession, especially those which include animal vermin, or those of the insect variety which play a part in the spread of disease. In connection with this subject the Vermin

Repression Society, having its headquarters at 44, Bedford Row, London, has recently been doing very active propaganda work against the rat and other plagues, and the result has more than justified its existence. It was largely owing to its support and activity that the present "Destruction of Rats" Bill became law, and a paper in this month's issue of the Journal by Mr. Parker, M.R.C.V.S., the Chief Veterinary Inspector of the Borough for Newcastle-on-Tyne, on the subject shows the necessity for adopting measures to deal with these troublesome brutes. It is to be hoped that the work of this society will not be confined to the destruction of rats alone, but take up the campaign against flies, lice, and many other pests which act either directly or indirectly as the transmitters of disease, and we in our profession should support the good work. From his training and his daily life the veterinary surgeon is the man who ought to pioneer subjects of this kind, and not allow members of other professions or the laity to take the lead. The opportunity is ours if only we will see and take it.

Original Communications.

THE SELECTION AND ADMINISTRATION OF GENERAL ANÆSTHETICS TO THE HORSE, DOG, CAT.

By FREDERICK HOBDAY, F.R.C.V.S.
(*London*).

It is now the law that a certain scheduled list of operations on animals *must* be done under a *general* anæsthetic, and that for those of another scheduled list the operator, whilst still bound to use an anæsthetic, is allowed the option of selection as to whether it shall be a general or a local one. It rests with us, therefore, to select the anæsthetic which fulfils the above requirements, and to ensure that we are sufficiently expert in the administration to cause insensibility to pain, and yet not endanger the life of the patient. To give a general anæsthetic with the maximum of safety requires in animals, just as much as a man, or perhaps even more so, one person's undivided attention, and this is one of the difficulties with which the veterinarian is faced, in that in by far the largest proportion of cases he has to assume the responsibilities of both surgeon and anæsthetist at the same time.

Precautions.

In selecting an anæsthetic, the age and condition of the patient, together with the chance which the animal has had of being properly

prepared, must particularly be taken into consideration, the pulse and respiration being especially observed.

General anæsthetics one can select from chloroform, ether, A.C.E., and A.E.C. mixture, and all of these have their advocates.

Whether, under this new Act, narcotic agents such as chloral, cannabis indica, morphia and H.M.C. mixture will be officially considered as anæsthetics and permitted to be used for the operations in Schedules 1, 2, and 3, remains to be seen.

Of *Local* anæsthetics we have cocaine, eucaine, novocaine, stovaine, holocaine, eudrenin, codrenin, hydrochloride of urea and quinine, ethylchloride, and orthoform, with adrenalin, renastyptin, suprarenin and styptics of that class of useful adjuncts.

In all cases, whichever is selected, it is of the utmost importance that the *method of securing* of the patient is such that there is the minimum of interference with the action of the heart and lungs. *This point cannot be too much emphasised* when tying up a large animal or securing a small one, and there is no doubt that it was neglect of this precaution which did a lot to give the impression (so common in my student days) that the dog was an impossible subject for chloroform.

The dietetic preparation of the patient, too, for exactly the same reason, is urgently necessary, as pressure on the diaphragm from a distended stomach and intestine is distinctly bad. Although not a believer, like some, in a dose of purgative medicine beforehand, I am a great advocate for abstinence from food on the part of the patient for twenty-four hours previous to the administration of a general anæsthetic, and also that no water shall be given for about six or eight hours. The anæsthetic acts better, and, in the event of any struggling, there is less risk of rupture of the stomach.

Selection.

As regards the selection of the general anæsthetic, my own experience leads me, up to the present, to prefer chloroform for the horse and adult dog, and A.C.E. mixture for the young dog and cat.

If administered on rational lines, with careful attention on the part of the anæsthetist and due precaution as to preparation as regards the patient, the risks are comparatively small; and in order to avoid pain, unless narcotics are to be permitted to be termed anæsthetics (if the law is to be kept), these risks must be taken by both owner and patient.

How to minimise them, or, better still, do away with them altogether, must be the aim of one and all of us, and it is only by careful

observation of our difficulties and rectification of our mistakes that this can be done. Interchange of ideas at Society Meetings helps very much to get such an aim perfected.

Administration of Chloroform to the Horse.

Let us take now the administration of chloroform to the horse.

There are those amongst us who prefer to chloroform the animal in the standing posture, and others who always cast the patient first. I have had considerable experience of each, and except when dealing with a vicious beast upon which it is difficult to get the hobbles or ropes, I prefer to cast my patient first.

Then as to the use of an inhaler. Some practitioners object to it and use a sponge containing chloroform held over one nostril whilst the other is plugged or otherwise closed up. I object to this method on the grounds that I have seen the nostrils badly blistered afterwards, and I cannot say that I think that it has a single point in its favour over the use of a proper inhaler. An inhaler is, in my opinion, undoubtedly the best, and of the patterns of these we have Roberts' and Nelder's for the standing operation, Cox's and Carlisle's for the animals when cast. Personally, I do not like the Carlisle Inhaler, as I have seen deaths from its use, and I do not think that any inhaler which covers up the whole of both jaws and does not enable the tongue to be well pulled forward is nearly as safe as the patterns which only cover the nostrils.

Especially, from experience, would I emphasise this for any prolonged operation.

Although, when chloroforming standing, I like either Roberts' or Nelder's Inhaler (these both cover the whole of the mouth and nostrils), for getting the animals down I prefer to change to a Cox's pattern if the operation to be done is to be a prolonged one.

The Carlisle Inhaler can be used for chloroforming an animal standing, but its weight and clumsiness make it objectionable, and there is also difficulty sometimes in getting enough chloroform applied.

The secrets of success with chloroforming standing are to have plenty of space in which to do it—a field or large, clean straw yard is ideal—and secondly not to fight against the horse, but to do something which will attract his attention during the first four or five minutes in which he is inhaling the strange vapour and wondering what to make of it. Once he becomes drowsy and stupid it is not difficult so to regulate matters that he falls down quietly somewhere about the situation in which he is required. To do this a rope is put on either side of the head-collar and a man is placed on each with

instructions to humour and follow the horse's movements in such a way, as far as possible, as to keep the animal walking in a circle if he shows any inclination to be restless. The operator himself then attracts the horse's attention by making sounds, or in other ways, until stupor comes on. The late Mr. Richard Roberts used to advocate commencing with two ounces in the mask for an ordinary sized colt, and I have found no reason to alter his procedure.

For the cast animal I am very fond of Cox's pattern of inhaler, as it is cheap, easily cleaned, readily portable, and, I believe, the safest we have for the administration of chloroform to the horse. It should be sufficiently large and "roomy," so that there is no pressure on the wing of the nostril. Many of the patterns made are too small for general use. It can be made collapsible, and it is thus more portable for carrying about the country. I object strongly to the use of a sponge for the chloroform, and also to the use of vaseline or other grease to the nostrils. Instead, I prefer a pad of cotton wool about 12 or 14 inches in length, taken off one of the ordinary rolls of absorbent wadding in general use, and this can be folded in such an economical way that it will present a fresh clean portion to a succession of at least 12 successive patients, and I have never once seen a blistered nostril follow its use.

This, placed in the mask and covered by a horse rug or blanket once or twice folded in a certain way, so that there is no danger of asphyxia, forms a method which I have used and seen used satisfactorily many thousands of times.

The tongue, before the chloroform is applied, should always be pulled well forward, and in order to keep it there it can conveniently be secured by a loop of tape, the ends of which are fastened to the side of the head, collar or halter. To this I attach very great importance, and the hint originated from one of my old students, Mr. Hewer, M.R.C.V.S. With this method I have never seen a torn frenum, as sometimes occurs when the tongue is held by a man. As regards the amount of chloroform to put on to commence with, I always start, in the case of an average adult horse, with an amount varying from an ounce and a half to two ounces. Experience has taught me that when one exceeds this amount to commence with, provided the animal is getting it all, one can readily get into the danger zone, and I have seen four ounces produce death within a few minutes when improperly given. Put on, then, one and a half to two ounces, fold over the horse rug and allow, carefully by the watch, about eight or ten minutes before you expect a satisfactory anæsthetic. This will be sufficient to last, in the average case, for

about a quarter of an hour, and if more is added, this should be done at the discretion of the anæsthestist in two to four drachm doses.

In hot weather chloroform evaporates more rapidly than when the weather is cool or cold, and for this reason the dose administered is slightly smaller on close, hot, depressing days than when the weather is cool.

For most operations on the adult horse, a short anæsthetic is all that is necessary, and to produce this the method of shutting off the air is carried out to a much greater extent than one would dare to do in the smaller animals. If one produces slow, deep chloroform anæsthesia in the horse, and this is then maintained for a prolonged period continuously without any evidence of returning consciousness, the animal is apt to lie for a considerable time after the inhaler has been removed and to get hypostatic congestion of the lungs and chloroform pneumonia as a sequel. To obviate this, a horse in this condition should not be allowed to lie more than ten or fifteen minutes without being turned over.

Symptoms of Danger.

The Symptoms of danger are snoring, irregular breathing, and a gradual slowing down of the respiration, or the latter may cease suddenly Upon observing any one of these symptoms the chloroform mus be at once removed and the nostrils well opened to the air.

Antidotal Treatment

Antidotal Treatment, which should all be placed ready beforehand for instantaneous use, consists in pulling the tongue well forward, injecting a full medicinal dose of Scheele's Hydrocyanic Acid hypodermically or pouring it in the back of the throat (half a drachm to a drachm is what observation has taught me to advise as the dose), applying the vapour of Liq. Ammon. Fort. to the nostrils, and commencing artificial respiration, the horse lying, preferably, on the right side. The latter is best done by standing on the ribs (with the aid of a friend to obtain steadiness) and performing jerky pressures on the chest. Do not leave the patient until normal breathing is *well* established again.

Administration to the Dog and Cat.

For the dog and cat the securing of the abdomen in such a position that free play can be given to the organs of the chest is an absolute essential to safety, and the use of hobbles or an operating table does this with a facility which cannot be obtained by the mere holding by attendants. This is the first important procedure to be observed, and the second is to administer the anæsthetic (whether chloroform

or A.C.E.) steadily, with one's whole attention, in such a way that it is well mixed with air. The correct safe precaution of chloroform air mixture is 1.9 to 2 per cent, and to get this an inhaler is the safest and most useful. If this is not present and the "open" method has to be adopted, a single piece of lint stretched over a wire framework can be used. An ordinary wire muzzle, which fits properly and does not press upon the nostrils, answers excellently, either for the dog or the cat. *The great secret is to allow plenty of air to mix with the chloroform and not to hurry unduly.* The best plan is to work by the watch, and not to attempt to get complete anæsthesia in any small animal under from four to six minutes.

Once the patient is completely anæsthetised it is for the anæsthetist to alternately cease the administration of the anæsthetic or to administer more at discretion, and to give the matter his whole and undivided attention. If the services of another practitioner cannot be obtained, an intelligent canine nurse or groom, *who will instantly obey orders*, can readily be trained to make a successful anæsthetist. Care and the concentration of one's whole attention on anæsthetisation are the first essentials; the symptoms of danger are easily learnt, antidotes should be close at hand, and experience will soon give the necessary confidence and knowledge.

Although within the past few months I have again seen the statement that the dog is an almost impossible subject for safe chloroform anæsthesia, I am still prepared to hold to the statement I made some 22 years ago before the Society of Anæsthetists, also in the *Journal of Comparative Pathology and Therapeutics* (as the result of over 1,000 experiments), and the *Veterinary Record*, that if anæsthetised with due care and on rational lines, *the dog is the best possible subject for safe chloroform anæsthesia.* The preparation of the patient consists in abstinence from solid food for about 12 hours prior to anæsthetisation. For the symptoms of danger one has to watch the respiration closely, and the best antidotes to be used if necessary are to speedily remove the chloroform mask, draw the tongue forward, apply a full medicinal dose of Scheele's Hydrocyanic Acid from a drop tube to the back of the tongue, and the vapour of Liq. Ammon. Fort. to the nostrils.

The same applies, in each case, for A.C.E. or A.E.C. mixtures as for chloroform.

POST PHARYNGEAL SURGERY.

By E. C. WINTER, F.R.C.V.S.,
Limerick.

In your January issue I notice an article from the pen of Mr. R. Jones, M.R.C.V.S., Towyn, on Post-Pharyngeal Surgery, and I would like to say that I have been familiar with the condition known

as " snoring " in cattle all my life, and have had a wide experience in treating this affection.

My mode of procedure is to catch the tongue of the beast in the left hand with a cloth and pull it well out, when the right hand and arm can be safely passed down the throat and a manual exploration can be made. Before doing this, it is wise to get two strong men to hold the cow, the one on the left-hand side passing his right hand between the horns catching the nose, and grasping the tip of the left horn with his left hand, and placing his back against the cow's shoulders. The man on the right-hand side in a similar position holding the right horn, it being impressed on both men the absolute necessity of keeping the beast's head straight and the muzzle elevated. If the abscess is fit for opening, I generally open it with the finger nail, so as to insure that the resulting wound will not heal too rapidly, making a large, jagged opening. If the finger nail is not able to effect this object, I use a concealed knife carefully attached to the wrist by a string or piece of tape. Should the abscess not be in a condition for opening, I apply a sharp blister all round the throat and call again a week later.

These abscesses are nearly always tubercular, and there is a probability of their recurring. In most cases immediate relief is given to the patient, but there is always a risk of the owner or attendant getting alarmed twenty-four or forty-eight hours afterwards and sending again for the practitioner. This summons may be disregarded, as the condition arises from the wound made in the throat, and the trouble passes away in a short time. With two fairly handy attendants it is quite possible to operate on any sized animal without casting or chloroforming, and the risk of choking is very slight, if it exists at all, and the hand and arm can be withdrawn immediately on any sign of this occurring. It is, of course, impossible in the case of small animals to get the hand and arm down the throat, and here we must use a gag and open the abscess with a long knife, but I find from experience that this condition is rare in young animals.

I must have operated on, in the last thirty-four years, some thousands of these cases, and the result has been favourable in 99 per cent. of them.

I have also met two or three cases of Polypi, most of them being enclosed in the abscess and surrounded by pus. They are easily dealt with by snaring them with a piece of strong string and cutting off with a concealed knife.

Some twenty years ago I had a nasty accident when operating on this latter condition in a small Kerry cow. One of the attendants

let go his hold and the cow, twisting her head around and getting the first molar a half inch into my wrist, severed the nerve supplying the thumb and first finger. I was, however, able to remove the tumour successfully six weeks afterwards, but for some months had to wear a pad to protect the scar resulting from the rejoining of the nerve endings, and I got a slight electric shock when anything touched it.

The manual dexterity needed for these operations is acquired by practice, and the only thing one has to be careful about is not to allow the hand to remain any length of time in the neighbourhood of the molars, either when inserting or withdrawing it, as the animal will very easily push it aside with the tongue and get it between the teeth if allowed to do so. I have only had this one accident in thousands of cases, and I think my experience might be of some use to my brother practitioners.

THE RAT PROBLEM.

By THOMAS PARKER, F.R.C.V.S.
(*Veterinary Inspector, and Inspector of Meat, Provisions, etc., Newcastle-upon-Tyne.*)

The Brown Rat (*Mus decumanus*), sometimes referred to as the common brown Hanoverian or sewer rat, is larger than the Black Rat (*Mus Rattus*).

It is believed to have made its first appearance in this country in the year 1729, being brought by ships trading with the East. It has now almost superseded the black rat, being not only larger but a more formidable animal. It should be noted, however, that during recent investigations within the London district, both species have been found living in harmony, not only on the same premises, but in the same rooms. Furthermore, on one floor of a factory in Holborn, not only were both species of rats captured, but also specimens of the Alexandrine Rat—the brown variety of the *Mus rattus*, and the black variety of the *Mus norvegicus*.

Fecundity.—Rats commence breeding when six months old and are fully grown a few months later. The period of gestation is about three weeks. They may have several litters in the year, each litter comprising on an average eight young. They are born naked and blind, are covered with hair on the eighth day, and are able to see on the thirteenth day. On the twenty-first day they have reached the size of a mouse, and are turned out to shift for themselves when about six weeks old. It has been calculated that the progeny of a single pair of rats may amount to 800 in one year. It will be evident, therefore, that rats may increase in numbers very rapidly if undis-

turbed and sufficient food is available. Mice breed at six weeks old and are fully grown at three or four months old.

A Menace to Public Health.

Rats may prove to be a real menace to public health in several ways, the chief of which are briefly :—

As carriers and transmitters of dangerous diseases.

By contaminating food and water supplies.

By causing insanitary conditions generally.

Besides the Trypanosoma lewisi, a protozoal parasite which is harmless to its natural host and not known as a parasite of man, the rat is a carrier of two other protozoa, namely, Spirochæta icterohæmorrhagiæ and Spirochæta morsus muris, which are responsible for two serious diseases in man, known respectively as

Weil's Disease or Spirochetal Jaundice ; and

Rat-bite Fever.

Other diseases that require special consideration are :—

Plague.

Trichinosis ; and

Tuberculosis.

1. *Spirochetal Jaundice* occurs in most parts of the world, but most commonly in Japan. It was frequently met with amongst the allied troops in France, the trenches being infested with rats. Although this disease has been conveyed to man by rat-bites, it is probable that contaminated food and water is the most important source of infection.

2. *Rat-bite Fever* has been known for a long time in Japan, and cases of similar illness have been described in this country, the United States of America, and elsewhere. During 1918, rats caught in and about the City of London were examined by Alexander Foulerton, F.R.C.S., for the presence of parasites causing these diseases. Of 101 rats examined, four brown rats were found affected with Spirochæta icterohæmorrhagiæ, whilst of six rats examined for Spirochæta morsus muris, none were found affected. Whilst it has been clearly proven that rats capable of conveying Spirochetal Jaundice have been found within this country, it would be unwise, on the other hand, to conclude that rats capable of conveying Rat-bite Fever do not exist, simply because six were examined for that disease with negative results.

3. *Plague* is a specific and infectious disease affecting man and some of the lower animals. Between the year 1896 and the beginning of 1905 no fewer than 3,150,000 persons died from Plague in India. With the ending of the great outbreak of Plague in 1664—1679, this country was free for more than 200 years. According to a Memoran-

dum issued by the Local Government Board, outbreaks of Plague have occurred periodically during the past twenty years at several of our ports, and, in view of these facts, Sanitary Authorities are advised to be always on the alert, and especially for ascertaining the cause of any recognised excessive sickness in rats, or of human illness of a doubtful nature associated with sickness or mortality in rats in the same district.

As rats are subject to Plague, and are often killed by it in great numbers, they are the most dangerous of all animals so far as the spread of the disease and the creation of new centres of infection are concerned.

It should be remembered, however, that fleas form the intermediaries between the diseased rat and man. When rats are dying of plague their blood is literally swarming with the bacilli of that disease. Fleas feeding on plague-infected rats get plague bacilli on to their mouth parts and myriads of them are, of course, sucked up into the stomach with the blood. Those on the proboscis may be transferred directly to the next victim that it is thrust into, and those in the stomach may be carried for some time and finally liberated when the flea is feeding again or when it is crushed by the annoyed host. In fact, the latter is probably a common method of infection, for the bacilli that are liberated when the flea is crushed may readily be rubbed into the wound made by the flea bite—or into abrasions of the skin due to the scratching. A useful hint to remember would therefore be—Kill the flea, but don't " rub it in."

The rat flea (*Ceratophyllis fasciatus*) occurs on both the brown and the black rats, on the house mouse and frequently on man.

The common human flea (*Pulex irritans*), although regarded primarily as a pest of human beings, often occurs very abundantly on cats, dogs, mice and rats, as well as on some wild mammals, and occasionally on birds.

The dog and cat fleas (*Ctenocephalus canis and felis*) are very often troublesome household pests besides being frequently found on rats.

Fleas usually leave rats as soon as they die, and, of course, seek some other source of food.

Furthermore, human fleas bite rats, and fleas found on dogs and cats bite both human beings and rats. Again, as human fleas and fleas found on cats and dogs can live on rats as casual parasites, they are able, therefore, to play an important part in the transmission of plague from rat to rat or from rats to human beings and *vice versa*.

4. *Trichinosis* is a disease of man and animals caused by a parasite —small worm hardly visible to the naked eye—called the Trichina Spiralis.

Human beings acquire the disease by eating the flesh of infected pigs, and pigs become diseased through the agency of trichinous rats.

The infected flesh contains larval Trichinæ Spiralis, and when it is eaten by carnivorous animals the larvæ are set free from the muscle by the action of the digestive juices. When they reach the intestines they become adults and sexually mature. Each female gives birth to a large number of embryos. Some of these are excreted in the fæces, but most of them are carried to the muscles in the blood stream. The embryos, which invade the muscles, become coiled up and surrounded by a cyst wall formed by the tissues, and they remain alive in this situation for a considerable time. Animals may be infected not only by eating the flesh of other infected animals, but also by consuming other food which has been soiled by fæces containing the larval forms. It will be readily understood, then, how pigs may infect each other through their fæces. It should be borne in mind, however, that probably the main factor in the up-keep of Trichinæ Spiralis is the rat, for these animals are very easily infected, and are not infrequently, in nature, harbourers of the parasite. Again, as they commonly exist about piggeries, they may soil the food of the pigs with their excretions while the parasites are in their intestines, or they may be eaten by pigs, and so give rise to disease in the latter animals. As an illustration of how human food may become contaminated with the active elements of this most repulsive disease through the agency of rats, the following case will suffice :—

In February, 1909, at Exeter, two persons who had consumed some salted pig's flesh became seriously ill. One of them, a labourer, was thought by his medical attendant to be suffering from trichinosis. A specimen of the salted pig's flesh was then sent to the Veterinary Department of the Board of Agriculture, where it was examined and found badly infested with Trichina spiralis. On making inquiries at a farm it was found that the flesh had come from a sow which had been ailing for about two weeks before it was slaughtered. Although the sow was in good condition and fed well, she had shown great difficulty in using her hind quarters, so much so, that she had even to be assisted to rise. On this account she was slaughtered, pickled, and used for food. On making further inquiries the farm premises were found to be overrun by rats. One of these was secured, and upon examination its abdominal muscles were found to contain a very large number of trichinæ. Small pieces of the abdominal muscles were then—for experimental purposes—fed to a white rat, which died four days after eating the diseased flesh. On examination adult trichinæ were found in the intestines. These intestines were

fed to another rat which also died four days later. Adult trichinæ were found in its large intestine. The carcass and intestines of this rat were then fed to three white rats. The carcass was freely eaten, but the intestines appeared not to have been touched. Seventeen days later two of them were found dead, and in the muscular parts of the diaphragm of one of the latter encysted Trichinæ spiralis were found.

It would appear perfectly clear, therefore, that not only did the muscles of the rat secured at the piggery contain living trichinæ, but that it was highly probable that the sow became infected through the agency of diseased rats on the premises.

5. *Tuberculosis* of the rat, sometimes termed rat-leprosy, is a chronic infective disease which has been found to exist in five per cent. of rats specially examined in Odessa and Berlin. The disease has also been described as existing in rats in this country. The exact relationship between rat tuberculosis and forms of tuberculosis amongst other animals is uncertain, but it is believed to resemble tuberculosis of birds more closely than any other variety.

Pseudo-tuberculosis is the term applied to another disease—highly infective—which exists as affecting the rat. In fact, in 1916, an outbreak occurred amongst trench rats in France, a considerable number becoming infected.

As the rat possesses a high degree of immunity against the micro-organism causing the common form of human tuberculosis, it is conceivable that the human subject may—in a similar degree—possess natural immunity against the so-called rat tuberculosis.

It has been definitely established, however, that human beings do suffer from the same form of tuberculosis as found in cattle ; and by experience one is aware of the fact that not only healthy, but also tuberculous carcasses and organs, whilst hanging in private slaughter-houses, are commonly overrun by rats. These rodents often cause serious damage to healthy carcasses ; but when they are overrun and eat into tuberculous material and, having got their limbs, etc., well contaminated, pass on either to a healthy carcass with the same or adjoining slaughterhouse, or to some part of the district, perhaps a dwelling, the possibilities of spreading disease are by no means negligible.

Hungry Rats are Ferocious.

Many years ago, a vessel, carrying cattle to this country, was wrecked off St. Mary's Island on the North East coast. Some weeks later a number of workmen had occasion to visit the vessel. Not long had they been on board when large numbers of long lean rats

made their appearance and attacked the men. The latter took refuge up the rigging and finally had literally to fight their way overboard and make their escape by rowing from the ship "for all they were worth."

The late Mr. R. Stephenson, M.P., related a peculiar affair. In the Walker Colliery, in which many horses were employed, the rats had accumulated in great multitudes. It was customary at holiday times to bring to bank the horses and fodder, and to close the pit for a time. On one occasion, when the holiday had extended to about a fortnight, during which the rats had been deprived of food, on re-opening the pit the first man who descended was attacked by starving rats, and speedily killed and devoured. Other peculiar instances are on record, including one where patients in hospital at Goccrito, Trinidad, suffering from leprosy, had their toes eaten off by rats. The rats seemed to know that the patients were too weak to defend themselves against their attacks.

Damage done by Rats.

It has been estimated that the damage done to foodstuffs alone amounts—in value—to no less than £15,000,000 annually. If to this were added the amount of loss through destruction of articles of various kinds, other than foodstuffs, the total sum would be enormous.

Goods stations and other railway premises, docks, wharves, cattle and pig lairs are all frequented by rats. In town and country alike, and in towns in particular all the year round, they frequent common sewers, hen runs, allotments, market gardens, dwellings, shops (butchers, grocers, fish, confectioners, fruiterers, &c.), bakehouses, cafes, wholesale meat establishments, slaughter-houses, triperies, warehouses, granaries, flour mills, paper mills, large stores, workshops and factories, sewage farms, scavenging tips, knackeries, marine stores, hotels, fancy goods and millinery establishments and other premises too numerous to mention. In town and country rats frequent rubbish heaps in search of food and occasionally migrate from such centres in large numbers. On farm premises corn, cattle food, potatoes, and other kinds of foodstuffs are destroyed. Even chickens and young ducks are carried off. By burrowing beneath and in close proximity to buildings, rats frequently let down the drains, thus bringing about open joints and other insanitary conditions. In search of water, pipes are gnawed through, causing leakage and the flooding of premises. Woodwork within dwellings, offices, warehouses and buildings of every description receives particular attention. Walls may be riddled until the building is simply honey-combed. Within butchers' shops, during the night, rats will

climb down the iron rods until they reach suspended quarters of beef and cause an immense amount of damage by eating into the fleshy parts. In drapery and house furnishing establishments, the annual damage amounts—in various instances—from £50 to £250; in fact, ten or a dozen fur muffs may be destroyed within one night, and curtains, ladies' hats, towels, blankets and other soft goods are known to be destroyed regularly. The hair seating of chairs is sometimes gnawed through and the stuffing removed, presumably for the purpose of nest-making. It must be remembered that the foregoing are only a few samples of the innumerable kinds of foodstuffs and articles damaged. A precise list of material damage caused by rats would, undoubtedly, be most startling.

Preventive Measures.

Whatever measures are adopted against rats—by way of prevention—those that are calculated to make it impossible for them to obtain food and water should be considered as being the most important. Animal foodstuffs used in stables, byres, kennels, poultry farms and other premises should be kept in metal or sheet iron bins.

Ricks surrounded by five-and-a-half feet high galvanised iron sheetings dug two-and-a-half feet into the ground are effectually protected. Another method is to build them on stone piers surrounded by a wide inverted pan or saucer-shaped rim of tin sheeting; the piers should be three to three-and-a-half feet high with the protecting rim near the top. Other buildings are difficult to repair, but where possible, iron sheeting, brickwork and cement should be used. In some cases it would be impossible, short of rebuilding, to render premises rat proof. In piggeries and poultry runs, the animals should be fed, where possible, in the presence of attendants, care being taken to remove all food-stuffs not required.

Refuse must not remain unprotected within the yards of private dwellings. All vegetable matter, bones or other such unusable waste foodstuffs should be burned, and ashes kept within properly covered receptacles.

No waste foodstuffs of any kind should be thrown indiscriminately into the back streets for the purpose of feeding stray dogs. Similar precautions particularly apply to those in charge of cafés, restaurants, hotels, and shops of various kinds. It matters not whether it be within a theatre, picture hall, railway carriage, railway station, office, work room, tea room, warehouse, workshop, factory or any other place where small or large numbers of people have their meals. It should be considered as a public offence either to throw pieces of biscuit, bread, fat or other waste food on to the ground or leave such

articles lying about. Any such waste material as cannot possibly be utilised should be carefully disposed of by burning. Within slaughter houses and other places, garbage and refuse should be kept until removal for destruction within properly constructed galvanised iron receptacles. Everything possible should be done to remove rubbish heaps. Within stores of every description the contents should be moved as frequently as possible, and within large warehouses packages should be so arranged as to reduce the privacy of the rodents to a minimum. Burrows from which rats have been driven or which lead to others may sometimes be successfully intercepted by being filled with a mixture of cement, sand and broken glass or crockery.

It is highly essential to have defective drains attended to, and wherever possible old or disused drains should be removed. As vessels arriving at the various ports are almost certain carriers of rats they should be dealt with as soon as possible on arrival. Another matter requiring careful attention is the protection of natural enemies of rats and mice. These include owls, hawks, buzzards, ravens, stoats and weasels.

Remedial Measures.

Before referring to the various measures to be recommended for immediate application it will, perhaps, not be out of place to briefly describe a method which has for its object extermination by directly opposing the ordinary laws of nature. It is known as the " Rodier " method.

Bearing in mind the number of young in each litter and the number of litters produced within a year, it is believed that were a scheme adopted which would, in effect, with certainty gradually reduce the number of females, success would be assured, for it is almost certain that the time would arrive when the males would co-operate in completing the process of destruction. Rodier claims that by the present methods more males are caught than females, with the result that those not caught live in a polygamous state. Because of being polygamous, the females are more prolific than they otherwise would be, and produce more females than males. The way to exterminate rats is to make and keep them polyandrous, that is, the males in excess to the females ; and the way to do this is to catch the rats alive and uninjured, kill the females and liberate the males. When this is done, the males will persecute the females that are not caught, and thus prevent breeding. They will also kill the newly born, and when they largely exceed the females in numbers they will worry the remaining ones to death. By this means all the females will be exterminated,

and the males remaining will finally die of old age. The greater the excess of males the quicker the extermination.

To put into operation such a scheme, it would be necessary for all rat infested premises to be thoroughly equipped for the purpose of catching rats alive and uninjured. Furthermore, large numbers of rat-catchers would have to be employed to regularly visit such premises for the purpose of separating and killing the females and liberating the males.

Again, it would be equally essential for all districts to be operating continuously in the same direction. Otherwise, having regard to the migratory habits of the rodents, the scheme would be hopeless. Were it shown that destruction by baiting accounted for as many females as males, then providing the " Rodier " method were found practicable of universal application, a combination of the two methods would be well worth consideration. Before considering the application of any such scheme, however, it would be desirable that the probability of its success should be thoroughly investigated, not only by specially designed experiments, but also as to whether its application could be properly maintained throughout the country. In the opinion of the author, even were the method proved theoretically correct, it would probably fail for want of co-operation, for there are few people who either care to handle rats, detain them on their premises alive or liberate those already secured.

The methods of destruction may be described under the following headings, namely :—Baits, Poisons, Gassing, Trapping, Hunting, and Virus.

Baits.

It is commonly believed that faint traces of the oils of rhodium and aniseed attract rats. It has been proved, however, that instead of improving the bait they have the contrary effect. And of all the baits tested, the one that has been found most readily accepted is dry bread. The tastes of brown and black rats have been found to be practically identical, and the following table will serve to illustrate the merits of the various foodstuffs used as bait in experiments carried out within the Zoological Gardens, London. The percentages given are based on the ratio between the attractiveness of the various baits and plain bread—the favourite food, which is represented by the figure 100 :—

Bread (plain)	100	Malt	20
,, (faintly flavoured with Rodium)	40	Maize	20
		Dripping	20

Bread (faintly flavoured with aniseed)	30	Cabbage	20
,, (soaked in milk)	60	Potatoes (mashed with milk)	20
Oatmeal	80	Lard	10
Tallow	70	Bacon	10
Banana	60	Beef extract	10
Flour and water ..	50	Lentil meal	10
Oats	50	Fish (fried)	10
Barley	50	Raw meat	0
Tripe	50	Sugar	0
Bloater paste	30	Apple	0
Fish (smoked)	20		

Notwithstanding the preference for certain foodstuffs—used as bait—as indicated by the table submitted, no hard and fast line can be laid down to suit all conditions, for rats, like many other animals, may under varying circumstances differ in their tastes. For example, quite recently the author tested the most favoured and one of the least favoured baits—as found by the London tests and illustrated in the table—namely bread and meat. The bread was plain and the meat was minced. Each was mixed with barium carbonate. They were both laid down at the same time and place in the evening, and on making an inspection the following morning it was found that the meat bait had all been removed whilst the bread bait remained untouched. Again, where, after a while, the bait is refused, a change should be offered.

Poisons.

Phosphorous, Arsenic, and Strychinne are often used in the preparation of rat-pastes or vermin killers, but, as they are all rapidly fatal in their effects on man and the domestic animals, and therefore dangerous, are not recommended. There are others which, whilst being rapidly fatal to rats, are comparatively harmless to domestic animals. These are Barium Carbonate and Squill.

Barium Carbonate.—Although 1½ to 2 grains suffices to kill a rat, barium carbonate is more or less harmless to domestic animals, cats and chickens withstanding 10 to 15 grains, and an average-sized dog over 100 grains. It has also the advantage of being cheap, tasteless, odourless, and therefore easily made attractive by mixing with a suitable bait, and has been found to be as effective as the more dangerous poisons, such as phosphorus and arsenic. The bait may be prepared in the following manner :—Make a paste by well mixing equal parts of the powdered barium carbonate and tallow-fat or dripping and spread it over thin slices of bread exactly as one would do with butter. Then, having firmly pressed the slices together to form sandwiches, they are cut into small squares ready for use. Of

course, it may be mixed with any other bait found equally or more acceptable. Owing to the action of barium carbonate on the lining membrane of the stomach the rats are induced to leave their holes in search of drink. It is recommended, therefore, to place within reach, on the day following the treatment, shallow bowls containing a solution consisting of equal parts of liquid squill and milk ; the rats being thus made to partake of more poison in their efforts at relief.

Squill may be obtained either in the form of a powder or of a solution. Although comparatively harmless to domestic animals it is extremely toxic as far as rats are concerned, the minimum lethal dose being only half a grain. Mix the powdered squill with tallow or dripping, or with either of these fats and oatmeal. The mixture should be smeared on bread, the latter being then cut into small pieces. In the liquid form squill may be prepared for use in the following manner :—Mix equal parts of liquid squill and milk, and to each pint of the solution add one pound by weight of bread.

Of all rat poisons, squill solution is believed to be the most effective, and has been recommended in preference to Barium Carbonate for the following reasons :—

(*a*) It is three times as toxic for rodents.

(*b*) It is even less harmful to most domestic animals. The one point against the use of squill, however, lies in the fact that at present it is somewhat more expensive than most other poisons.

There is always a possibility of a rat dying under flooring or behind wainscoting, either through poison or otherwise. If a rat from a drain takes poison, and cannot regain its habitation, the carcass will most probably become putrid. If such a rat dies near a fireplace or hot water pipe, the stench will be intensified. Chloride of zinc is a good deodoriser in such cases, and combines with and neutralises the offensive chemical products of putrefaction. If necessary, a hole should be bored with a bit and brace in the vicinity of the supposed source of origin of the odour, if possible. Some perfume or pine-wood oil can be added to the zinc chloride, which should be applied through the hole. A cork will close the orifice, and can be withdrawn from time to time to ascertain whether the nuisance has abated. Where possible, however, it is advisable to remove the carcass immediately its presence has been detected.

Gassing.

Of all the methods advocated, gassing, under certain conditions, is the quickest and most certain for destroying rats on a large scale. When employed in buildings or other places where the runs are not easy of access, gassing has the advantage over all others in that it kills not only the adults but also the young or newly-born in their

nests. The most suitable gas to employ, and the one recommended, is sulphur dioxide.

Sulphur dioxide is a heavy gas and may be prepared by burning sulphur in air or oxygen. It is non-inflammable and has a pungent, suffocating odour. It is comparatively cheap to prepare and is quite harmless to man and the domestic animals when inhaled in small quantities. When sulphur dioxide gas is driven into rat holes under pressure the whole network of runs is permeated in a few seconds, making the existence of the rats underground impossible. Although many of the rodents escape only to die in the open, some no doubt recover. The gas kills many of the rats by immediate suffocation, whilst those that escape into the open die from acute congestion of the lungs. To secure rats bolting from the runs, the co-operation of a dog is desirable. For the destruction of rats on board ship the method just described may be strongly recommended ; and, no matter whether employed on land or ship, the fact that sulphur dioxide gas is a disinfectant as well as a deodorant may be considered an advantage. For rat destruction on board ship sulphur candles have been employed with success by the Port of London Authority. Probably the most successful means at our disposal for using sulphur dioxide gas is an apparatus manufactured by the Clayton Fire Extinguishing and Disinfecting Company, Limited, London. The Clayton machine is provided with a generator in which the gas is made and driven through a hose by means of a powerful blower.

Two other bodies may be employed for causing rats to leave their runs when hunting along hedgerows or in old farm buildings where the runs are within thick walls :—

Carbon disulphide is a colourless, heavy and extremely volatile liquid. It may be employed by soaking wadding, cotton waste, or some such material, and placing the latter into the hole and then immediately covering the hole in. In this way the vapour is allowed to permeate the runs. As the vapour of carbon disulphide is highly poisonous it must be used with caution, and no light or smoking should be allowed during its application.

Acetylene is a colourless, rather heavy gas, having a peculiar, unpleasant odour. It is made by decomposing calcium carbide with the aid of water. When employed along hedge rows, pieces of calcium carbide within tow may be placed within the entrance of the run, then after saturating with water the entrance is quickly closed in with pieces of turf. Owing to acetylene being not only highly poisonous, but exceedingly explosive, great care must be exercised as to its application, which should not be within buildings.

Trapping.

There are numerous kinds of cage and other traps on the market, most of which are more or less successful. Probably the most successful type is the *Brailsford Trap*. It consists of a long, narrow wire cage with doors at each end, which, when the trap is set, remain open, having a direct passage through. A platform in the centre, where the bait is placed, is connected by a spring which, when trodden upon, releases the doors, imprisoning the rat or rats. It has been found that the trap 8 inches high gives by far the best results.

The Mysto Trap consists of a metal structure connected with a tank full of water. The bait is placed just inside the door, which closes on the entry of the rat. In order to effect its escape the rat climbs up the cage to a hinged platform, which collapses, precipitating the rodent into the tank. The collapse of this platform automatically opens the door of the cage, and the next rat is thus enabled to enter and repeat the performance.

Barrel Trap.—This may consist of a barrel, the upper and open part being covered with brown paper which is cut crosswise over the middle. The bait is suspended by a thin wire immediately over the centre or where the cuts intersect. The rat in attempting to reach the bait is suddenly precipitated into the barrel.

Amongst other traps successfully employed are the ordinary cage trap with bait hook, and with a platform connected by a spring with the door; the steel gin trap, a type generally popular with the gamekeeper; and break-back traps.

Hunting.

Hunting with dogs and ferrets is a method generally employed in country districts, about farms, hedge-banks, and other places.

Virus.

It would appear that in many cases the use of virus has proved very satisfactory, in some fairly satisfactory, and in others distinctly disappointing. It is probable that in some cases, owing to improper exposure, the virus loses its virulence.

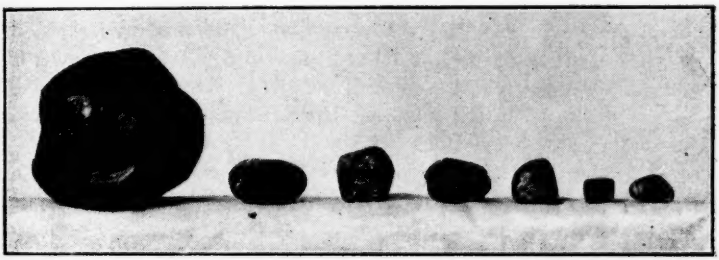
Further, it is possible that in some cases hasty conclusions have been arrived at before the disease, if conveyed, has had time to incubate and declare itself. Again, as in other diseases, it seems probable that many rats possess a certain degree of natural immunity and are not affected, whilst many that are affected receive the disease in a mild form, gradually recover and thus acquire a certain degree of immunity or protection against a second attack. Finally, the warning as to the use of poisoned baits applies equally to the employment of rat viruses, that is to say, it is important to avoid contamination by the virus of any material likely to be used for food.

GALL STONES.

By EDWARD MORGAN, M.R.C.V.S., D.V.H.,
Puerto Cabello.

Subject.—A six years old Venezuelan steer (Sp. Novillo). On ante-mortem examination the animal appeared perfectly healthy, and was in good grass-fed condition for beef purposes.

Post-Mortem.—The boy who was trimming the livers noticed something unusual in the gall bladder, and on cutting through with his knife, a huge-sized gall stone dropped to the net used for collecting them. There was also one small flattened faceted gall stone in the bladder. The large one weighed exactly eleven ounces, and was eleven inches in circumference. It was of the usual brown colour. Its surface was fairly smooth, and faceted at one small area, where the smaller one had wrought its form, as seen by the illustration.*



Gall Stones.

Owing to its abnormal size, there could have been but slight movements of the stone inside the bladder. Seeing that the smaller one was confined to one particular area was a proof that a great deal of pressure was exerted from the bladder wall. The liver was diseased with spotted capillary angiomatosis, which disease is prevalent in the bovine livers of this country. There were no flukes present. The organ was of an average size and weighed about 9¾ lbs. The carcass, apart from the liver, appeared healthy and in good condition throughout. Seeing that the gall bladder was in such an abnormal state, one would have surmised the presence of jaundice.

Gall stones are prevalent in the Venezuelan cattle; as a matter of fact, South America is considered by the Chinese and Japanese as one of the best countries for supplying them with these valuable

*In the above illustration the large gall stone is the one described in this article, where the facet is noticed. Unfortunately, the smaller one was mislaid. The others are illustrated for comparison only.

Reference: Scherington's Physiology Notes; Clarkson and Farquharson, Physiology.

essential constituents from which they extract dyes for painting their china-ware. These biliary calculi are met in various shape and structure, as illustrated—spherical, oval, angular, flattened, and with smooth or roughened surfaces, and if there are more than one present, are more often than not faceted. Should a single faceted stone drop into the net, the liver trimmer knows that there are more to be found, either in the gall bladder or biliary tubules. Beads of faceted gall stones are often found in the latter, and the majority are cubical in form, and faceted on the six surfaces, apparently the result of a certain amount of rolling movements taking place before entering the gall bladder. The presence of such large quantities of gall stones in the biliary tubules appears to be conclusive that the evidence given by some members of the R.C.V.S. at courts of law were erroneous and misleading, when expressing the opinions that owing to the fact of the absence of a gall bladder in the horse, there can be no gall stones present in its liver. The majority of the small-sized cubical gall stones are found in the biliary tubules of the liver of the ox, and it is quite possible that most, if not all, of those found in the gall bladder nucleated in the tubules. This is only a supposition based on what I witness daily.

The greatest number of gall stones which I saw in one single liver was in that of a horse which Mr. H. Sumner, M.R.C.V.S., demonstrated once at the Liverpool University.

If the same number of equine livers were subjected to the same rigid examination as those of bovines, probably we would hear more often about the presence therein of gall stones.

In a country like Venezuela one would anticipate to find less abnormalities of the kind, where the cattle live in a natural wild state, out on the open vast plains, and are monarchs of all they survey, except when the puma, jaguar, alligator and rattlesnake challenge their rights. Nevertheless, we have reasons to assume that there is deficiency of some essential elements, either in the food or water. The first thing which attracted my attention on the plains was the deep excavations here and there, sometimes deep enough to engulf an average-sized house. The earth from these cavities has been scooped out by cattle, while evidently searching for some earthy salts, which they are unable to obtain in sufficient quantities in the grass and water. They appear like sheep in a root field, with their heads covered with earth, and the saliva drivelling from their mouths. These plains are long distances from the nearest salt water coast. When the cattle are driven down to the frozen meat works, they travel the last few miles along the sea-coast, and here they lick the earth on the road-side, and often eat noxious grasses and herbs, such

is their craving for salt. We often see cases of acute gastritis, sometimes as many as 50 per cent. of the paunches contain such lesions. One will naturally surmise the above as the direct cause of such acute lesions. The seasons are two here, viz., six months of dry weather, or drought, and six of wet weather, or rainy season. During six months of the year the cattle have to accumulate a store of fat so as to resist the lean six months, when the grass dies up, as well as most of the streams, and cattle have to search for water from stagnant pools, which are often fœtid. In the spring months of the year the majority of the livers contain liver flukes.

I mention the above conditions as it may assist some keen observer to get nearer solving the question of the cause of gall stones, which are more prevalent in some countries than others. Physiologists admit that the whole story of metabolism is far from being plain, but that we get glimpses here and there of the changes which the food undergoes, and that from these we must patch a history as well as we can. It is apparent that a large proportion of the food passes through the liver on its way to the general circulation, and that metabolic changes take place in this organ.

It has been proved that animals rapidly die if they are fed with food from which the salts have been extracted. They exhibit symptoms of weakness and general disturbance of the nervous system, often leading to convulsions.

Gall stones are composed of bile pigments, such as Biliverdin, which gives the green colour to herbivorous bile, and occurs in the urine in jaundice. Cholesterin is also often present in great quantities in gall stones, also calcium, in combination with other ingredients, such as carbonates and phosphates.

It has been suggested that the presence of parasites are a cause of gall stone formation, such as the liver fluke, also the presence of Bacillus coli; excess of salines, undue retention of certain fluids, fermentation, etc. In human beings diseases of the gall bladder is common in the tropics, and acute and chronic inflammations. Gall stones are often met with and are considered as sequelæ to typhoid fever, and also arise from other causes.

Physiologists state that there is a close relationship between the blood and bile pigments. Evidences that the bile pigments are derived from the hæmoglobin of the blood are conclusive, and now generally accepted. If free hæmoglobin be injected into the blood-stream, the pigment of the bile is increased in quantity and appears in the urine.

From the veterinary inspector's point of view, as an individual, the synthetical is more interesting than the preventative, due to the

fact that pathological specimens are supposed, for obvious reasons, to be his property. The present price of £30 (thirty pounds) a pound is a great temptation to reduce the reserved collection almost to a minimum, and convert it into gold. A gall stone like the subject of this article is worth over £20 in the Japanese market.

Biliary calculi are said to cause colic and great pain during their passage through the bile ducts. Also when the escape of bile from the gall bladder is hindered by obstruction of the common bile duct, re-absorption of the biliary constituents from the interlobular ducts of the liver takes place into the lymphatics surrounding them, leading on to jaundice. It is remarkable that of the hundreds of cattle which we examine here almost daily, and, as already stated, a great number of them contain gall stones, I have hardly ever met a case of colic amongst them, and very few cases of jaundice.

AN INTERESTING CASE OF MULTIPLE SARCOMAS IN A STALLION.

By FREDERICK HOBDAY, F.R.C.V.S., *London*, AND GEORGE HARRIS, M.R.C.V.S., *Sawbridgeworth*.

THE subject was a valuable Shire stallion, 4 years old, which had for some months been observed by the owner to groan when passing fæces, and had lately begun to lose muscular condition on the back and quarters. Affairs were brought to a climax by the formation of a hydrocele involving the whole of the scrotum. This was "tapped" but, as was surmised at the time, reformed in a few days.

It should have perhaps been mentioned that when the colt was ten weeks old it had a very severe attack of strangles, and only pulled through by the most assiduous care in regard to nursing and artificial feeding.

As the groaning increased and the colt began perceptibly to fall away, the owner decided to have the animal destroyed.

Post-mortem examination revealed the abdomen to be absolutely full of greyish white tumours varying from the size of a walnut to a half-quartern loaf, the pelvic cavity being one huge mass. Sir John MacFadyean, who very kindly examined several of the specimens, declared them to be sarcomas.

AN OBSERVATION ON THE CASTRATION OF FARM ANIMALS.

By FREDERICK HOBDAY, F.R.C.V.S.
London.

RECENTLY I had the opportunity of watching the castration and spaying of some farm animals by a practitioner in the Eastern Counties, and although I know that the time taken is nothing very

extraordinary, I also know that only a comparatively small proportion of our present-day college students have ever seen such demonstrations of dexterity. We ought not to have the idea that such are beneath our notice, as, if so, these operations are allowed to become the nucleus of the unqualified practice of the quack, who gains his 'oot-hold in a district by their expert performance.

The first batch was one of eight male pigs, each 7 weeks old, all of which were caught by a farm hand and disposed of within three minutes, the actual operating part taking 61 seconds; an average of less than 8 seconds each. Three were timed at 4 seconds each. Four female pigs of the same age averaged 40 seconds each from the moment the incision was made in the flank until the wound in each case was sutured.

In each case afterwards the animal walked away apparently quite unconcerned.

A six-weeks-old male calf took 35 seconds, and a two-year-old colt, with the help of one farm hand only, took 2¼ minutes to place the clams on and remove the testicles.

RUPTURE OF THE ŒSOPHAGUS AND RIGHT AURICLE IN A DOG.

By W. S. HARRISON, M.R.C.V.S.
(*Hertford.*)

The subject was a small Pomeranian dog, recently brought to me for examination, the owner submitting the following particulars relating to the case. "At eleven a.m. the dog accompanied me to a butcher's shop and was noticed to be eating something, which was apparently swallowed. On returning home he appeared somewhat uneasy, and occasionally coughed, but soon assumed his normal condition." During the evening the circumstance was mentioned to one of her sons, who had returned from London, where he is attending a course of study in one of the medical schools. She arrived at the conclusion that some obstruction had been, or was, located in the œsophagus. Then it was determined to send the dog to me for more exhaustive investigation. After careful external manipulation, and observing that all the ordinary urgent symptoms of choking were absent, I expressed the opinion that the obstacle had become dislodged, and then my attention was directed to the cartilages forming the larynx as being the enlargement supposed to exist. Having explained this as being perfectly natural, I placed my finger into the mouth, and well down the pharynx, and, subsequently, to thoroughly satisfy her, introduced a probang, which passed with the utmost ease, and no resistance on the part of the animal, into the stomach. The dog

remained for half-an-hour without showing the slightest sign of discomfort or uneasiness, and was taken away with instructions that all food, with the exception of a little milk and water, should be withheld until the following day.

Having occasion to pass the owner's house the following morning, I made enquiries and was informed that my patient appeared perfectly well, and had been running about the house and garden as if nothing had happened, and on seeing the animal this statement seemed to be perfectly correct.

Two days later I was in attendance upon some cats belonging to a lady who accompanied the owner of the dog to my house, and was greatly surprised on being told that it died the evening *after* I had seen it.

Thereupon I made another call, and gained the information that the dog maintained his good condition throughout the day until nine o'clock, and was then seized with a severe fit of coughing, uttered a loud yell, and immediately expired.

Having obtained permission to make a post-mortem examination, I found all the contents of the abdomen perfectly healthy and free from the slightest stain, the stomach containing a small quantity of semi-fluid food. I then opened the thorax by dividing the cartilages on both sides of the sternum, and discovered the whole cavity filled with coagulated blood. When a portion of this was removed, I noticed a piece of white matter about an inch and three-quarters long and five-eighths of an inch in diameter, composed of fibrous tissue, and evidently a portion of tendon cut from the extremity of a muscle; the chest was then washed out with water flowing from a tap, and the remaining viscera carefully taken out, when I found the œsophagus, pericardium, and right auricle of the heart ruptured.

And now the question arises: When did these lesions occur? Personally, I do not think the laceration of the œsophagus was caused by introducing the probang, or I should have noticed some resistance at the time, and the animal would have displayed some signs of injury before the expiration of twenty-four hours. It is obvious that the rupture of the pericardium and auricle only took place *immediately* before death.

URETHRAL CALCULUS IN A PONY—OPERATION AND RECOVERY.

By GUY SUTTON, F.R.C.V.S., and HAROLD STAINTON, M.R.C.V.S. (*London*).

The ability of a calculus to assume the shape and function of a valve is well illustrated by the enclosed specimen recently taken from an aged polo pony gelding.

The owner and groom had repeatedly noticed that micturition was performed with distinct interruptions and agitation of the accelerator muscle.

On July 20th, the pony was driven about 16 miles in a tub cart, and on return failed to urinate satisfactorily. During the next thirty-six hours straining was frequent, but only resulted in a few drops of urine being passed. On entering the box the clinical picture was diagnostic of urinary obstruction and the calculus could be distinctly felt about four inches below the ischial arch.

An emollient of belladonna extract was introduced into the urethra by aid of a catheter and hyocyamus was given in a draught in the hope that the "body," having already passed the ischial bend, might be ejected.

Only slight relief was obtained and no displacement could be discerned. Surgical removal was now urgent and the owner readily gave consent for operation. A rectal injection containing ʒi chloral hydrate was given, and after an hour's interval the patient was cast and secured on its back without much resistance. An incision over the prominence carried into the urethral canal exposed the stone, its removal being facilitated by a flush of urine. The wound area was painted with iodine solution and the pony allowed to rise. On entering his box he passed a further quantity of urine through the wound. The latter had closed by the fourth day and the pony was sent home at the end of a week. It was driven in harness on the twentieth day subsequent to the seizure.

Translations and Abstracts.

A VOLUMINOUS ABDOMINAL TUMOUR OPERATED ON SUCCESSFULLY.

By JOSE HERRERA.
Veterinary Surgeon of Puerto Real (Cadiz).

A WELL-SHAPED black mule about three years old showed a very large tumour in the abdominal region close to the fold of the right thigh. Agreed with the owner to operate, after fasting the animal; the tumour, as stated, was very big, was nourished by numerous blood vessels, had lived at the expense of the health of the mule, and latterly impeded its movements. Before the actual operation, and to prevent bleeding, dissected back the abdomenal subcutaneous tissue, which exceeded in diameter double that of a good milch cow, then proceeded to ligature the veins communicating with the tumour and the anastomosing branches which reached from the mammæ to the tumour and had acquired great size.

Three ligatures were put round the tumour, which was extirpated by using the cautery and bistouri alternately, and during the operation three artery clips were put on, and left on in order to prevent hæmorrhage.

The tumour weighed six kilogrammes (about thirteen pounds). After forty-eight hours the clips were removed and there was no hæmorrhage; daily advancing healing occurred; as a sequel, great inflammation arose, making one fear septicæmia, but fortunately this disappeared slowly in four days, the ligatures were removed from the mammary vein and the other branches which appeared to me to communicate with the external iliac had become obliterated, and the wound cicatrised freely. It was found during the operation that the attachment and situation of the growth rendered it impossible to remove all its root, owing to the considerable danger of penetrating into the abdominal cavity, and rupture from the spirit of the animal. The remains of the tumour were obliterated by means of the detergent powder made by the Arango Company, which gave us a good chance of studying its effect. At the end of a month the operation wound was less than that of an orange, and there was every prospect of complete cure. The case seemed of considerable interest clinically, hence my reporting it.—*Revistade Higiene y Sanidad Pecuarias.*

G.M.

THE OPHTHALMIC TEST FOR GLANDERS: WITH A SIMPLIFIED METHOD OF PROCEDURE.*

During the past few years extensive experiments have been carried on in several countries to determine, if possible, which of the mallein tests would give the most satisfactory results for the general diagnosis of glanders.

According to Mohler and Eichhorn[2] "In judging a method which would be the most satisfactory for the diagnosis of glanders, various things have to be taken into consideration, but especially the reliability of the test. It should be convenient, the results should be manifested as early as possible, the reaction should be distinct and well marked, and, probably the most important of all, it should be possible for the practising veterinarian to apply the test. The last condition must be seriously considered, since the standing of the veterinarian in the community and the confidence of the public in his work would be more manifest if in suspected cases he could personally decide on the diagnosis instead of having to depend entirely on the results of serum tests made at some distant laboratory."

*Abstracted from an article by D. N. S. Ferry, Detroit, Michigan, in the "Journal of the American Veterinary Medical Association."

It seems to be the consensus of opinion among most of the authorities, both in this country and abroad, that the subcutaneous mallein test is not as reliable as was first thought and that the ophthalmic test is by far to be preferred.

According to Mohler and Eichhorn[2] " There is no question but that the subcutaneous mallein test is one of the valuable diagnostic agents for glanders, but no one can any longer deny that failures from this test are more numerous than are desirable. As a matter of fact, the uncertainty of the results from this test caused numerous investigators to seek some other methods which might replace the subcutaneous mallein test. Besides the failures resulting in this test, the technic of execution of the test, together with the time required for the conclusion of the test, makes it unpopular for many veterinarians and sanitary officers."

In favour of the ophthalmic test the following authorities are quoted : Mohler and Eichhorn[2] " The popularity of the test is rapidly gaining wherever it has been applied, and among its supporters we find at the present time the greatest authorities on the subject of glanders and on clinical diagnosis."

" Its practicability is apparent, and its use in the control of glanders appears to be now an absolute fact." The method was thoroughly tried out by the Bureau of Animal Industry, and from reports in more than 18,000 cases the results from all sources were uniformly satisfactory.

The test has been officially recognised in several of the foreign countries, as well as in Canada and in the United States. In a report of Mohler and Eichhorn[2] they say, " In the United States the Bureau of Animal Industry, in consideration of the favourable results obtained, has recognised the method of diagnosis for inter-State shipments of equines."

Schnurer, probably the greatest authority on glanders, gives the following report[10] :

" During the period 1910-1913, 93,352 ophthalmic tests were carried out in Austria (excluding Galicia and Bukowina) ; out of these 341 glandered horses gave positive results in 88.8 per cent. of cases, doubtful results in 7.6 per cent., and negative results in 3.5 per cent. Out of 75,879 healthy horses 99.6 per cent. gave negative reactions and 0.34 per cent. positive reactions. The negative results in the glandered horses (3.5 per cent.) are attributable in part to the fact that the horses were not only tested once, or were tested only a few days before death, and probably in part to errors in judgment and mistakes in the post-mortem diagnosis."

He also says (1) " Glanders can be stamped out by the slaughter of clinically affected animals, and of animals recognised as diseased by means of a test. Immunisation is at any rate superfluous.

" (2)—The most satisfactory test is one that does not involve the intervention of a central authority, yields reliable results within a short time (12 to 24 hours) in the hands of persons who are not required to be specialists, is easy to apply and to base a decision upon, is suitable for application on a large scale on the frontiers, can subsequently be verified, and is comparatively cheap.

" (3)—The serological tests (agglutination, complement fixation, precipitation, conglutination, Abderhalden's test and anaphylactic reaction) do not fulfil these conditions either singly or in combination with each other, because they cannot be carried out without the intervention of a central authority.

" (4)—The ophthalmic mallein test (conjunctival reaction) carried out with a reliable concentrated mallein painted upon the eye with a brush, swab, glass rod, or some other instrument, and not dropped into it with a pipette or drop bottle, satisfies all the conditions mentioned."

In the Report of the Special Committee for the Detection of Glanders, mentioned previously, the following may be found: " In deciding upon a method which would be most satisfactory for the diagnosis of glanders, the simplicity and trustworthiness of the method must be above reproach.

" The results should manifest themselves as soon as possible, the reaction should be well marked and distinct and easily applicable by the average practising veterinarian.

" A test with these requirements places a test in the hands of the practising veterinarian, along with which the standing of the veterinarian in the community and the confidence of the public in the veterinarian is brought into closer relationship, in that it enables the veterinarian to personally decide on the results of the test.

" The ophthalmic test not only meets all these requirements, but is without doubt the most convenient diagnostic method at our command.

" Its reliability compares favourably with any of the other available tests.

" The reaction is usually distinct, and doubtful or atypical reactions are rather infrequent.

" The ophthalmic test does not interfere with subsequent serum or other mallein tests if such are deemed necessary.

" The ophthalmic test should be recognised by State and Federal authorities, since its reliability can no longer be doubted.

" In all atypical and doubtful cases of the ophthalmic test the combined complement fixation and agglutination or subcutaneous mallein tests should be utilised for confirmation. Such a procedure should minimise the failures and assure the best results in the control of the disease in a single stable or in an entire community."

A comparative investigation concerning the various biological methods of glanders diagnosis was undertaken, in Russia, by a committee under the direction of Prof. Dedjulin on 245 healthy and six glanders-infected horses, with the following results :

Opthalmic reaction	0 positive (0% failure in reaction)
Competent fixation method	0 positive (0% failure in reaction)
Agglutination	4 positive (2% failure in reaction)
Subcutaneous mallein reaction	4 positive (2% failure in reaction)
Precipitation reaction	11 positive (5% failure in reaction)

The ophthalmic and complement fixation reactions proved the most reliable methods in healthy horses.

In the infected horses all the methods gave positive reactions.

Dedjulin thus summarises the results of his investigation : " That the malleinisation (ophthalmic reaction) is to be regarded as the most efficient and for practice the most convenient aid for the diagnosis of glanders.

" It apparently yields no more failures in diagnosis than other methods, but it is decidedly simpler, and its execution can take place independently of the laboratory ; this latter is of no little practical significance. Moreover, the judgment of results of this reaction seldom offers occasion for disagreement in opinion."

The writer, in preparing the material for the simplified ophthalmic test, followed the work of Foth[4], Wladimiroff[5], Fröhner[6], Reinhart[7], Meissner[8], and others, who used a desiccated precipitated mallein. This was made up by them into a watery solution and used in a similar way to the raw mallein, with like results. Comparing the dry purified mallein with the raw mallein, Mohler and Eichhorn[2] state that " The advantages of the use of one as compared with the other of these forms of mallein for the eye are not marked, as equally good results were obtained from the application of both forms of this product."

The usual method of preparing the desiccated mallein is to precipitate the raw mallein with several volumes of absolute alcohol, wash the precipitate with ether, and dry *in vacuo*.

Taking this as the point of departure from all preceding methods, the writer moulds the purified mallein with milk sugar, which is a soluble, non-irritating and harmless base, into small tablets, in such a proportion that each tablet shall contain the exact amount of mallein

required for one test. Instead of dissolving the tablet in water prior to its application, as has previously been done with desiccated mallein, the tablet is placed directly into the conjunctival sac at the inner canthus of the eye and there allowed to remain. The tablet will soon (one to three minutes) dissolve without apparent discomfort or annoyance to the animal, and without an irritating effect upon the conjunctiva. The mallein which is thus set free produces typical reactions similar to those recorded as the result of the instillation of the raw mallein, or the solution of the dried mallein.

Soon after this material was first prepared and tested, Meyer, from the Laboratory of the Pennsylvania State Livestock Sanitary Board, reported his results with desiccated mallein, which was the first report on the use of desiccated mallein in this country. Meyer prepared his "Mallein Siccum" by precipitating the raw concentrated mallein with 30 parts of absolute alcohol. The writer, who used a much smaller percentage of alcohol, has found that it is not necessary nor desirable for practical purposes to use as much as 30 parts of alcohol.

Meyer concluded after a thorough test of 210 horses with his desiccated mallein that "The conjunctival test for glanders is very reliable. It can, in a short time, without large expense, be applied by every practising veterinarian and will permit the untrained to make a diagnosis of glanders with the greatest possible accuracy."

The advantages of the method proposed by the writer, for the general diagnosis of glanders, are evidenced by the fact that it fulfils the requirements of a most satisfactory test as suggested by Schnurer, Mohler and Eichhorn and others, while the material itself, being composed of desiccated mallein moulded into a convenient form, is extremely stable, can be handled with impunity and placed directly into the conjunctival sac without a previous solution in water.

REFERENCES of the American Veterinary Medical Association.

(1)—*Am. Vet. Rev.*, 1913-14, Vol. 44, p. 218.
(2)—*Bull. U.S. Dept. Agriculture*, No. 166.
(3)—*Zeit. f. Inf. und Hyg. der Haust*, 1912, Bd. XI, Heft 5.
(4)—*Zeit. f. Tiermedizin*, 1911, Vol. 15, p. 401.
(5)—*Handbuch der Technik, u. Methodik der Immun.*, 1911, Sup. 1.
(6)—*Monatshefte f. Prakt. Tierk.*, 1911-12, Vol. 23, p. 433.
(7)—*Ibid.*, 1911-12, Vol. 23, page 179.
(8)—*Centralb. fur Bakt. Orig.*, 1912, Vol. 63, p. 482.
(9)—*Jour. Inf. Dis.*, 1913, Vol. 12, p. 170.
(10)—*Proceedings, Tenth International Veterinary Congress, London*, 1914. *Collected Papers, Research Lab., Parke Davis and Co.*, 1919.

THE LONGEVITY OF ADULT ASCARIDS OUTSIDE THE BODY OF THE HOST.*

Wharton† has recorded experiments in which he kept the eggs of the adult common roundworm of man, *Ascaris lumbricoides*, alive in Kronecker's salt solution (physiologic sodium chlorid solution to which 0.06 gm. of sodium hydroxid per litre is added) for from six to twelve days. While I was in the service of the Federal Bureau of Animal Industry, I made some tests to determine the length of time that the common roundworm of the pig, *Ascaris suum*, could survive outside the body of the host. A number of these worms had been collected and thrown into about a 5 per cent. dilution of liquor formaldehyde and left for a few minutes. They were taken out of the formaldehyde and nine of them placed in Kronecker's solution and nine placed in physiologic sodium chlorid solution. The height at which the solution stood when made up was marked on the glass dishes containing them, and once a day distilled water was added to replace that lost by evaporation. The condition of the worms was noted every day except Sunday, and the room temperature noted every day except Sunday from the fifth day to the end of the experiment.

During the course of the experiment, the room temperature ranged from 27.5 to 30 C. (from 81.5 to 86 F.). The last survivor in the physiologic sodium chlorid solution, a male, was alive on the fourteenth day after removal from the host, and was found dead on the fifteenth day. Three females survived for nineteen days in Kronecker's solution ; two of these survived for twenty-four days, and one of these was alive on the twenty-sixth day after removal from the host and was found dead on the following day. In another experiment in which ten specimens of *Ascaris suum* were kept in physiologic chlorid solution, one worm was still alive on the fifteenth day. It appears, then, that ascarids may survive for fifteen days in physiologic sodium chlorid and for twenty-six days in Kronecker's solution.

The particular interest which attaches to this experiment is its bearing on a very common idea in connection with anthelmintic treatment. It is quite commonly believed, and the belief is shared

---

* Abstract from an article by Dr. Maurice C. Hall, Ph.D., D.V.M., in the "Journal of the American Veterinary Medical Association."

† Wharton : Philippine Jour. Sc., 1915, 10, 19.

by many physicians and veterinarians, and is expounded in reputable medical literature, especially the older literature, as well as in the advertisements of commercial houses, that when a patient infested with worms is fasted for twelve or twenty-four hours, the worms become hungry as a result of this lack of food, and that when an anthelmintic is administered, especially when it is given in some such vehicle as milk, the hungry worms will ingest the anthelmintic and thereby become poisoned.

There are two or three objections to such a belief. In the first place, when these worms can survive for twenty-six days in such an unnutritious medium as Kronecker's solution, it is unlikely that they would suffer the pangs of hunger after twelve or twenty-four hours in contact with the collapsed walls of the intestine and the relatively abundant contents of food, epithelial debris and secretions which are still present after such an interval. Moreover, it is known that the digested or partly digested food in the lumen of the host intestine is not the only food of parasitic worms, and it may constitute in some cases a very small part or no part at all. Garin says that nematodes of the digestive tract live at the expense of the wall of the digestive tract in all cases, and not on food in the lumen. According to Garin, some worms (*Heterakis papillosa*) live on mucus and intestinal juices; others (*Oxyuris, Ascaris lumbricoides, Ascaris suum*) live on epithelial cells; others (*Ascaris rotundata, Physaloptera clausa, Habronema microstoma*) live on lymphatic cells and lymph; others (*Strongylus, Ancylostoma, Graphidium, Trichuris*) live on blood. He states that the attack on the mucosa may be mechanical (with teeth, etc., as in the case of hookworm) or chemical (by digestive secretions), as in the case of whipworms. Much remains to be learned in this connection, but it is known that such forms should suffer no inconvenience whatever during the period in which the host animal is deprived of food. Finally, it is not necessary to suppose that anthelmintics must be voluntarily ingested by the parasitic worms in order that the worms may be destroyed. It is likely that they are either ingested without volition or that they exercise their lethal effects in some cases by absorption, as may be the case with such volatile anthelmintics as chloroform.

In any case, the preliminary fasting, as well as the preliminary purgation, previous to anthelmintic treatment, is of course a very desirable procedure. But its utility lies in the fact that it removes the bulky food mass which might otherwise protect the worm against the anthelmintic action.

MEDICINE A LA MODE.

Pills and the Leech I sing, of earlier worth,
When Sawbones were a less instructed lot,
When drugs were grown on trees or dug from earth
And the poor field of Medicine in its dearth
Was still a bare and black scene ;
When pills were pills and Almroth Wright was not,
When no one bred bacilli in a pot
(A curious stew, to naked eye inert),
And having called the net result a vaccine,
Inserted it in patients with a squirt !

O Turkey Rhubarb, Brimstone, Senna, Squills,
Names that should be on every infant's tongue !
What have they done with all those draughts and pills,
Those simple cures for simple aches and ills ;
Parrish, the thoughtful giver
Of blushing phosphates for anæmic young ;
Easton his syrup, and the produce wrung
From castor oil seeds culled in Asian lands ?
All gone ! The kindly cod still boasts a liver,
But do they use it ? No. The cry is " Glands ! "

And still more glands, what time the laymen gape
To see the levied tributes grow and grow ;
Nor guinea-pig nor tomcat shall escape ;
Nor yet the innards of the ancestral ape
Whose glands are interstitial,
And, like Medea's cauldron long ago,
Turn hoary eld all youthful and aglow.
Bring in more pigs and cattle, swell the crop—
A gland's a gland and must be beneficial—
Till every pharmacy's butcher's shop !

LUCIO.

Personal.

CONGRATULATIONS to Dr. W. H. Dalrymple, M.R.C.V.S., on his appointment as Dean of the College of Agriculture of the Louisiana State University, U.S.A., and Director of the State Agricultural Experimental Stations. The increased duties of this position have necessitated his resignation of the position of Editor of the " Journal of the American Veterinary Medical Association " ; this important

position now being taken by Dr. John R. Mohler, the well-known Chief of the United States Bureau of Animal Industry, Washington, D.C.

In view of the proposal to hold the next International Veterinary Congress in the United States, our American colleagues seem likely to have an exceptionally busy year in front of them.

Professor Ghisleni, whose name is well known as a specialist in surgery, has been appointed Principal of the Royal Veterinary College in Turin, Italy.

Reviews.

HORSEMANSHIP IN WAR.

A Veterinary History of the War in South Africa. By Major Gen. Sir F. Smith, K.C.M.G., C.B., with a Foreword by Field-Marshal Sir Evelyn Wood, V.C. (London: H. & W. Brown, 20, Fulham Road, S.W. 10s. 6d.)

In an Army Order of April 11, 1900, Lord Roberts wrote:—

"The success of military operations in this country (*i.e.*, South Africa largely depends on the mobility of the horses employed, and this ceases as soon as the horses fall into bad condition."

Yet by no previous writer, by no member of a Commission or a Court of Inquiry, have the reasons for the lack of mobility of the horses in the South African War been fully investigated. This book is the first in which the subjects of study are the conditions which led to a "series of horse disasters without parallel in war," in other words, this is the first book which, in seeking to explain why the war was so prolonged, and why our failures were so many and so costly, does not beg the question.

The work is divided into three parts. Part I (Oct. 1899 to Dec. 1900) shows why the cavalry had completely broken down by the time Kroonstad was reached on the way to Pretoria. Part II (Jan. 1901 to May 1902) deals with the period of the guerilla warfare, which, from the nature of the operations, was a period of dreadful wastage in horseflesh. Part III deals with technical questions.

The material is derived from the diaries and notes of several veterinary officers; the co-ordination is effected by General Smith's clear and complete understanding of the whole campaign. The exactitude of the work is equalled only by its clarity, sincerity, and most refreshing frankness.

The author considers that by the time we had reached Kroonstad the cavalry was finished; that there should have been made at Bloemfontein a halt of sufficient duration to enable the horses with the troops, and the remounts which were immediately to be issued to them, to be conditioned. The monthly wastage would have been not 28 per cent., as it was, but 8 per cent.

XUM

"Briefly, had we conditioned and fed our horses well, the miserable and shameful toll of waste during the year 1901 would never have occurred." Had the veterinary officers been consulted, had their recommendations been given effect to *early* in the campaign, the war would have undoubtedly been shortened.

Besides showing the immense importance to the country of an efficient veterinary service, such as we now have, this book traces the formation of the present service "piece by piece, in the face of opposition."

Although the book only now appears in book form, the fact that it was published as a supplement to the Veterinary Record in 1912-14 no doubt enabled the War Office to profit by its valuable lessons, and to avoid a repetition during the present war of the scandalous wastage of horse life and public money which was so shameful a feature of the war in South Africa.

It is obvious that this is a work which future historians must take into account, and, as regards its technical importance, the late Field-Marshall Sir Evelyn Wood V.C., who writes the Foreword, says:

"It would be difficult to exaggerate the importance of the study of the book by all army officers, and especially by those of the mounted branches and staff officers, at the present day and in the future."

ANNUAL REPORT OF THE PUNJAB VETERINARY COLLEGE, CIVIL VETERINARY DEPT., PUNJAB, AND THE GOVERNMENT CATTLE FARM, HISSAR, FOR THE YEAR 1918-1919. Printed by Superintendent Government Printing, Lahore. Price 10d.; obtainable from Constable & Co., 10, Orange Street, London, W.C., or T. Fisher Unwin, 1, Adelphi Terrace, London, W.C., etc.

COLONEL H. T. Pease, C.I.E., acted as Principal of the College during the year, and Colonel J. Farmer, C.I.E., as Chief Superintendent of the Civil Veterinary Department. There was a good entry of students for both the three and four years' courses, but owing to the war and the absence of the Post-Graduate professor on military duty, the Post-Graduate course was abandoned. Mr. W. Taylor occupied the chair of Pathology and Parasitology, and Mr. E. Burke, I.S.O., was Professor of Surgery; the other posts were held by native teachers. Fifty-seven men qualified during the year, and 17 men of the four years' course passed into the Army; 39 students passed their first examination and 34 their second. Owing to a severe epidemic of influenza the College had to discontinue work, and the lack of oil for lighting purposes and the rebellion in Lahore all contributed to upset the study at the establishment and render the pass list worse than in the previous year. The Farriery course failed owing to illness of the Head Farrier and his deputy, and no suitable man being obtainable for the post, the forge had to be closed to the public. The horse practice was about normal, the cattle practice declined somewhat, and in the small animals' hospital, 400 indoor

XUM

and 286 outdoor patients were treated. Fifty-seven dogs were inoculated against rabies, and the results proved very successful.

As usual, the demand for veterinary graduates increases, and the supply is totally inadequate. Another Vernacular College is badly wanted, as is also proper hostel accommodation for college students. In the Civil Veterinary Department there were seven chief members of staff. The Superintendents travelled the district widely in connection with horse and cattle breeding, the investigation of contagious diseases, and the inspection of veterinary hospitals. Influenza interfered with the work of the hospitals, and the work done there shows a decline from the previous year; 16,728 animals were castrated. The stud bulls and the stallions have increased in number. The Government Cattle Farm at Hissar did very satisfactory work. G. M.

THE REVIEW OF APPLIED ENTOMOLOGY, October and November, 1919.—Series B: Medical and Veterinary. Issued by the Imperial Bureau of Entomology, 88, Queen's Gate, S.W.7., and sold by the same. Price 6d. net.

These little magazines are exceedingly useful for anyone who wants to keep abreast of the times on this subject in all parts of the world. All the insects and mites are studied in the various stages of their activity, and work and investigations in connection with them in countries so far apart as Albania and Dahomey and Italy and Japan are discussed and described.

The Review shows what powerful factors in the transmission of disease insects are, and it also shows how important scientists consider a study of their life and ways are in any effective control and eradication of disease.

We can thoroughly recommend the publication, as both interesting and instructive reading matter. G. M.

NOTICES.

All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C.2. Telephone: Gerrard 4646. Telegrams: "Baillière-Rand, London."

Letters for the JOURNAL, literary contributions, reports, notices, books for review, exchanges, new instruments or materials, and all matter for publication (except advertisements) should be addressed to the Editor.

Manuscript—preferably typewritten—should be on one side only of paper, marked with full name of author.

Illustrations for reproduction should be in good black or dark brown ink on white paper or card.

Advertisements and all business matters relating to the JOURNAL should be addressed to the publishers, Messrs. Baillière, Tindall and Cox.

Annual Subscription for the British Empire, 18s., post free; for the United States, $4.50; or combined subscription with the "Veterinary News" (weekly), 30s., post free.